MIGRATIONS AND MACROECONOMIC PROCESSES IN POSTSOCIALIST RUSSIA: REGIONAL ASPECT

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Annotation
Migrations and Macroeconomic Processes
in Post-socialist Russia: Regional Aspect

This is an attempt at testing two alternative research hypotheses about emergence (or non-emergence) of the mechanism of interregional migrations in post-Soviet Russia appropriate to market-based systems. The information base are the RF Goskomstat data on migrations and social-economic parameters of regions in 1996-1998. The analysis is made with employment of a wide circle of modern mathematical-statistical methods: cluster, discriminant, factorial-regression, etc. A conclusion is made that three different mechanisms of interregional migrations are operating in parallel. One is appropriate to emerging market relations, the second is a hangover of the pre-reform period, the third is territorial consequences of the general economic collapse. The recovery from crisis will reinforce the favorable effect of the first and extinguish the effect of the third.

Key words: Russia, regions, migration, mechnism of interregional migrations, macroeconomic factors of migration, migration models…

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Introduction

Unde venis et quo tendis?

Horace

In the period of transition to market the pre-reform social-economic mechanism of inter-regional population redistribution was destroyed in Russia. The constituents of the former mechanism which was functioning under rigid administrative control (through the system of prohibitions such as residence permits, for example) and in the absence of labor and housing markets (or, more precisely, in their shadowy pseudo-presence) were both "resource-consumption" factors (introduction of new housing, average monthly pay, retail turnover, meat consumption) and "structural" factors (fixed capital per worker in industry, percentage of urban population in region, etc.) And all changes in migration patterns of the last pre-reform three decades (1960-1990) had behind them mostly regional changes in the intensity of housing construction (per capita new housing). [Korel a.o., 1989]. Destruction (or transformation?) of this mechanism in the period of transition has led to large changes in the patterns of migration.

The main change in the 1990s is reversal of its direction, i.e., exodus from former centers of attraction (for example, the northern oil belt of Russia) and positive net migration in regions that before were consistently losing their population (the

Volga-Viatka, Central-Tchernozem, Ural regions). The task is, therefore, to reveal a new mechanism of interregional population redistribution that has emerged after legitimation of housing and labor markets, or, maybe, to discover new (or transformed?) elements of the old one.

The *significance of this research* is associated with the absence of reliable knowledge about the present mechanism of interregional migrations, which is needed to know to forecast arrivals to regions and design a system of civilized means backing the desired migration patterns.

The purpose of the study is to reveal, by use of mathematical-statistical methods of analysis, a system of macroeconomic factors underlying the present interregional migration in Russia and try to answer the question if a new mechanism appropriate to market-based social systems has emerged in it.

Therefore, the central question we are going to answer in the result of the study is as follows. Has already appeared in Russia a mechanism of interregional population redistribution which would (if only in the least degree) be appropriate to the emerging market conditions and responsive to new market institutions? Or the present map of Russian migrations is fully in the field of catastrophic forces: 1) ethnical exodus of the Russian-speaking population from the near abroad and from regions of high ethnical tensions in Russia (Chechnia, Tyva, Yakutia) to the areas of their origin (where the present migrants or their ancestors used to live in the past), 2) stampede of the population shocked by the tragedy on Sakhalin, from seismically dangerous areas of Russia (Sakhalin, Kamchatka etc.), 3) escape of population from ecologically adverse zones etc.

We are going to test *two alternative* assumptions. *One* is that despite strong "noises" of catastrophic migrations, a mechanism of inter-regional population

redistribution appropriate to "normal" market conditions is emerging. The *other* is that “noises” of catastrophic migrations are so strong, and other migrations are so much affected by economic destabilization and depression that no normal market mechanisms can emerge.

To test the constructed hypotheses means to identify, in a large space of objective conditions supposedly affecting migration, a group of social-economic factors of the market type. Ideally, this group of factors will contain the characteristics of the whole range of regional markets, i.e. labor market (labor demand and supply), housing market, market of goods and services, land market, market of resources and market of capitals (investments). Be it , however, in a full or truncated form, it gives an opportunity to directly test the hypothesis about presence (of absence) of the market mechanism of interregional migration in the contemporary Russia. The presence of this mechanism will be seen in people’s adequate response to situations in regional markets, i.e. avoidance of regions with unfavorable situations on these markets and gravitation to regions with favorable conditions. At the same time, the favorable situation in the labor market in a region is not always accompanied by a similarly satisfactory situation in the market of housing or in other markets, and vice versa. In addition, the degree of their influence on migration will be different.

Hypothesis No.1 will be corroborated if a direct relationship between migration variables and social-economic parameters of regions characterizing their market situation is discovered. Otherwise (in the absence of such a relationship) we will have to conclude that the alternative hypothesis (Hypothesis No. 2) is true, i.e. that the present mechanism of interregional population redistribution is based either on factors that are neutral to market (including those of a spontaneous, unpredictable

nature), or that no stable system of socioeconomic factors that would affect interregional migration has formed.

Reliable instruments for verification of the stated hypotheses are, in our view, mathematical-statistical methods and models of migration.

2. Mechanism of interregional migrations: a retrospective view

The mechanism of interregional migrations is a conceptual construct so far having no generally accepted interpretation or generalization but actively used in professional literature. "Mechanism" is usually understood as the internal device of an object putting it in action. *According to this, the mechanism of interregional migration is a combination of means (factors, attractions, determinants, regulators) by which the migration potential of the population is realized and it (population) moves among the regions.*

To reveal the mechanism of interregional migration is to answer the following questions. What social-economic "factors-attractions-determinants" cause people leave some regions and be attracted by others? Along what channels (organized or spontaneous) and in what form (voluntary or involuntary) does migration of population take place? What social institutions regulate this process? The analysis is made, as a rule, at two levels, i.e. macro and micro. Macro analysis focuses on factors, attractions and determinants of "macro environment": on different economic potentials, natural-climate, political, environmental, ethnical, social-cultural conditions of the life of the population in regions as well as on the institutional practice of migration regulation. Microanalysis, in its turn, focuses on cognition of the mechanism of individual acts of interregional migration, on qualitative features of the migrant himself and on concrete conditions of his life activity (his micro setting). This research is focused on investigation of *elements* of the mechanism of interregional migrations at the macro level.

What is, then, the difference in the mechanisms of internal interregional migration between market economy and distribution economy that existed in Russia before the 1990s?

The main difference concerns legally fixed freedom of spatial movements. It is inherent in nations with market-based economy (market is impossible without free movement of capitals and labor) and is absent in nations with a "distribution" type of economy (slave, feudal, socialist societies exercising rigid control over population movements). The freedom of migration was the last one in the series of civil freedoms acquired in Europe (the end of the XIX century). Russia falls behind by a whole century. The absence of institutions limiting freedom of movements is the essential component in the mechanism of internal migrations in democracies with market-based economy. In Russia, such institutions in different historical periods were: passport system (universal passportization had not been completed until the mid 1970s; before that time it excluded rural residents who, in legal terms, were not free to move to and settle in cities), residence permits (indispensable registration with internal security bodies which issued of these permits on certain conditions), forced placement of college graduates to concrete jobs, criminal liability for job quits and movement without official leave (imposed in 1940 and being in effect for about ten years) etc. [Korel, 1991].

Another difference is domination in market economy of market institutions regulating people's movements and absence of such institutions in distribution economy. In market economy spontaneous migration is an element of the general process of capital reproduction: it is through such migration that the task of supply of labor of the right quality and in the right place is fulfilled. While the capital movement is motivated by search of superprofits, main migration flows as if "automatically" follow changes in its location. Flight from unemployment, new vacancies opening in the labor market, prices of housing – these factors ultimately determine mass interregional migration. This process is also affected by other factors: natural-climate and ecological conditions, social-cultural and ethnical environment etc. but, as is known, they act within certain limits. Natural constraints on free choice of place of residence are primarily vacancies in the labor market and situation in the housing market,

with housing market being in a sense secondary to labor market mostly attending to its interests.

In the USSR with its public ownership of means of production, the state had, in its specific economic and political interests (to improve labor productivity, exercise control of a territory etc.), to perform deliberate centrally planned territorial redistribution of the population. For these purposes needed was a system of above mentioned institutions limiting the freedom of movements in a direction undesirable for the state as well as a system of institutions stimulating movements in desirable directions: organized attraction of manpower to enterprises and construction projects in areas of intensive development, public recruitment, agricultural resettlements from labor excessive to labor deficient regions, agitation, propaganda etc. It should be noted that in the USSR migration existed mostly as an officially planned process only in its organized forms the significance of which was sharply decreasing with time. While, according to A.V. Topilin, organized migrations made in the 1930s-40s 30-40%, in the mid 1970s 10-12%, then in the 1980s they hardly exceeded 2-3% [cited from Rybakovski, 1987]. Housing and labor markets, at different stages in history, either were absent, or lingered out a shadowy, half-legal existence (such was, for example, the institution of housing exchanges in the 1970s-1980s- precursor of housing market).

What laws, then, governed the movement of "unorganized" domestic interregional migration and what was its chief result – interregional redistribution of the population (net migration)? This topic was and still is one of the most controversial ones in the problem area of migrations. It is because in reality there are several differently directed basic migration vectors, each with its own driving force and mechanisms, patterns of their own. The outcome of these vectors is just resulting picture of interregional population redistribution.

We will try to schematically describe the main stages and logic of the conceptions by which it was attempted to explain the mechanism of interregional redistribution of the population in Russia in the last four decades. This logic started from acknowledgment of "shifts of industrial location" as the main factor in the mechanism of interregional migration (which, in general, fitted migration processes in pre- and post-war periods) to focusing on the

factor of “regional disparities in living standards”. The latter made it possible to explain the unexpected turn in migration long-term trends seen in strong exodus from labor deficient northern and eastern to labor surplus southern and central areas that occurred in the 1960s. But it failed to explain the unexpected improvement of net migration of eastern regions (primarily Siberia) that occurred in the 1970s. Then a conception of “labor resources increase” [Zaionchkovski, 1976] was put forward, according to which, under low increase of labor resources (that is when job choice opportunities are wider and more diverse) the influence of regional disparities in living standards on migration increases, but at high increase of labor resources employment opportunities (job vacancies) become the dominant factor in interregional migration. This conception successfully explained the unexpected trend in migration flows of the 1970s. But it failed to predict the results of migration of the 1980s. In the first half of this decade not only the migration situation of the 1960s did not return as was predicted by the authors of this conception on the basis of its logic, but, moreover, positive shifts of the mid 1970s, that is, eastward movement, increased. As is seen, under conditions of extensive-oriented pattern of economic growth the supply of vacancies hardly could be the determining factor in the spatial population redistribution, although in different periods and in different regions it was able to make some influence on this process. At the end of the 1980s attempts to understand the reasons underlying the shifts in migration trends in the previous decades continued to be made. It was discovered, in particular, that in Russia all changes in the direction of migration vectors from the 1960s to the 1990s were associated mostly with changed position of regions in the hierarchy of the key component of their migration capacity, that is of the housing capacity or, more precisely, with per capita new housing (sq. m) indicator. Thus the conception of “housing capacity of regions” [Korel a.o., 1989] appeared. In the period of consideration, the new housing indicator, despite conventional views, turned out to be weakly connected with the increase of job vacancies in regions, but seemed to be a direct result of forced pressure and lobbying of the interests by particular regional elites. The positions of these elites were changing with time. Changed was the map of housing construction (new housing) which was followed by the map of

interregional population redistribution. This factor, certainly, acted along with and in interaction with other factors of living level, primarily with retail trade turnover, average monthly wage, meat consumption etc. In the end of the 1960s and beginning of the 1970s a semi-legal housing market began to operate in Russia, that is the system of housing exchanges which while making interregional migration possible did not provide full freedom of movements that were checked by the institution of residence permits by which the state exercised its control of housing exchanges. But the lock was opened. Individuals with excess living space got a chance (and often took it) to move west- and southward and those with space deficit moved eastward to improve their housing situation. There appeared if illegal but an opportunity to pay for additional living space, additional comfort and better location [Korel a.o., 1989]. Therefore, within the "distribution" economy market elements were emerging. The system of housing exchanges is still present, but now it has been liberated from previous constraints.

Summing up the above said, note that direct relationship of migration processes to industrial location as a global pattern finds its way through many deviations or even retreats. In the scales of long historical periods (such as centuries) people's settlement over the country's territory, direction of migrations ultimately are determined by dynamic shifts in industrial location. But within shorter periods of time (such as a decade or even two or three decades) this tendency is often absent. The leading role in the mechanism of spatial population redistribution other factors begin to play. Just such a situation was in Russia in the last three decades of the Soviet period. In this connection note the following. 1. The country had extensive-oriented pattern of economic development, its economy was labor deficient almost everywhere (except for the North Caucasus and a few other regions), and under these conditions labor demand and supply did not, as a rule, make a decisive influence on the results of interregional migration. Moreover, in some historical periods labor surplus regions actively gained their population at the expense of labor deficient regions contrary to all economic and migration laws. 2. The state treated man as a resource, a means instead of goal in the historical process which is seen in its ignorance of his basic needs, including his need

in comfortable accommodation. This generated an acute housing crisis. Long-time waiting lists for housing (sometimes taking over 20 years) were common in all regions of the country. It is for this reason that new housing construction was a mighty factor in migration redistribution of the population. In its turn, "possession", in fact renting, housing whether in the North or the South potentially made a person spatially mobile giving him a chance to move to other regions through the system of housing exchanges (after breaking through many juridical barriers).

Russia's entrance the way of economic and political reformation has destroyed the institutions by which the state restricted the freedom of migration. What is the behavior of migration flows in the new environment? What factors are influencing them? What is the picture of interregional population redistribution like?

A reliable instrument to answer these questions and verify the above mentioned assumptions will be, in our view, mathematical-statistical methods and models of migration.

Models of Migration in Professional Literature

In international and domestic literature rich experience has been accumulated in migration simulation. Due to duality of "subjects" of migration (in one case it is the territory with a changing size of population, in the other it is the moving individual,) there are *two lines*. The former is obviously of a spatial nature: the carrier of migration are regions. The analysis is aimed at discovering macroeconomic and macrosocial parameters underlying attraction (gain) or repulsion (loss) of the population. The latter is associated with individuals, with their decisions about movement from one region to another on the basis of their individual characteristics and specific living conditions. This line is focused on simulation of an individual act of migration and presupposes search and analysis of motives, causes and determinants of the movement.

Out research is within the former line, which in literature demonstrates a rather wide range of migration models. They include gravitation, vector-logical, discriminant models, models based on Markov processes etc. For all this diversity of models and their modifications, the dominant form of models used to reveal the dependence of migration flow upon different supposed determinants is building equations of multiple regression. This model is based on assumption that migrations are caused by regional economic, ecological and social differentiation: in incomes, employment, situation in labor market, ethnical tension, technological level, health services, education, housing situation, living levels, air and water pollution, etc. Such analyses with regard to various areas and in various years were undertaken by many researchers: Hiks, I.R., Hart R.A., Isard W., Greenwood M., Rogers A., Ben-chien Liu, Andie L., Gallaway J.T. Stouffer S.A., Olsson G., Zaslavskaya T.I., Vinogradova Ye.V., Borodkin F.M., Matlin I.S., Rybakovsky L.L., Makarova L.L., Staroverov V.I., Nozdrina N.N., Zayonchkovskaya Zh.A., Korel L.V., Trofimov V.A. and many others. But in the 1990s the interest in the mathematical-statistical analysis of migration processes has declined in Russia. Research is focused on highly dynamic new migration processes - brain drain, flows of ethnical refugees and forced migrants - the processes that do not lend themselves to a strict mathematical description. The focus of research is the qualitative description of these processes. As to the relationship of migrations to macroeconomic regional variables analyzed with the use of mathematical-statistical apparatus, such kind of research is very rare. In this connection we can mention the studies of Trubin V.V. who showed that with increased rate of unemployment in the Russian regions the negative net migration increases [Trubin, 1995].

In the recent international literature there are many prominent studies describing the relationships of migration to macroeconomic processes.

Ian Wooton and Rodney D. Ludema [1997], with reference to present-day Europe and on the basis of the Krugman economical-geographical model, have discovered that labour movement across national borders was insufficient which impeded the establishment of closer relationship among the nations within the same region. Trade liberalisation however eliminates trade barriers and, in its turn, eliminates barriers to human migration.

Foreign researchers of migration pay attention to the leading role the wage is playing in migration between relatively poor South-European and North-African states and relatively rich Central European states. The decline in propensity to migration in the former may be attributed to wage growth at home, while its rise to wage growth in Central Europe (a study of migration relationship to economic growth on the case of South Europe, Riccardo Faini and Alessandra Venturini, 1994).

Luigi Di Comite [1994] states that basic migration flows take place between rich demographically stagnant regions and developing countries with their poverty and high population increase.

Of interest is a model of hedonistic migration [Shields, Michael P., 1995] by which the authors show that national economic growth in general increases relative attractiveness of regions of a time-saving type (reduced amount of time required for house keeping). According to this, in the long-run perspective migration will be directed to time-saving regions of the world, and, accordingly, the price of housing in these regions will be increasing in parallel with their increase in GDP. The supposed geographical centre of migration attraction is the USA.

There are excellent studies of the relationship of immigration to labour markets and employment on the case of the USA and regions-donors such as Puerto Rico, Salvador etc. [Borjas George J. and Richard B. Freeman., 1992].

We should also mention a study of Canadian immigration policy with a significant conclusion about its two opposite trends existing in this country for many decades. One is directed to promote the economic and demographic growth by stimulation of long-term immigration. The other emphasises satisfaction of current labour demand by use of short-term immigration [Alan G. Green and David A. Green, 1996].

Migration processes in present-day Russia have found their reflection on the pages of western literature too. We can mention [Mitchneck Beth and Plane David, 1995] who consider migration movements in the period of political and economic shock of the 1989-1992 period on the case of the Yaroslav region, thorough papers of T. Heleniak devoted to the issues of internal migration in Russia during economic transition as well as to population exodus and depopulation of the Russian north in the 1990s [Timothy Heleniak, 1997, 1999]. In the former T. Heleniak refers to unpublished work of A. Brown who undertook the analysis of migration factors on the 1993 data. On the basis of this analysis, the author did not find any essential relationship of migration to any employment dimension, including unemployment. At the same time, it was found that regions with a high nominal wage were gaining and those with high prices were losing their population. An unexpected result was the negative relationship between the index of industrial output and migration, it was also discovered that regions with above average housing privatization had more favorable indicators of population inflow.

It is, therefore, easy to see a fairly broad area of social-economic factors of migration studied by international researchers of migration. At the same time, most of foreign studies are oriented to the so called «price» parameters as well as wages. We

should note already at this point that in our case (present-day Russia) this kind of approach is not quite correct in view of the absence of a strong direct relationship between migration increase and price variables such, for example, as per capita money incomes, money expenditures, per capita turnover of goods etc. This situation is caused 1) by «shadowy» movement of great amounts of money that go unrecorded in present Russia, i.e. shadowy incomes (and expenditures) of the population, 2) by existence of price zones differentiating regions by different prices for the same products, and 3) by a high time variability (instability) of many price characteristics.

Methodological and Theoretical Model

The project is implemented within "sociology of variables". This field of analysis was given its name by Harmut Esser in 1996 (Oxford) although it has existed already a few decade. The sociology of variables appeared at the link between sociology, economics and demography. It brings together quantitative social studies, as a rule, with a great amount of data characterizing the features of the "context" – of social-economic space where individuals (or social systems) exists, make decisions and act. An implicit assumption is that contextual feature are forming the field of forces under which the individuals (or social system) are taking a position described as dependent variable. The specific objective of this discipline is in finding out the "significance" of this field of forces, which, in its turn, makes it possible to use a wide range of mathematical-statistical methods and models. A similar objective with reference to regional migrations in Russia was also before us.

The central methodological problem of our study is not so much the choice of a variable to be modeled (their circle is obviously limited and transparent) as that of independent variables – macro-socio-economic parameters. In the choice of

independent variables we are going to use ***two alternative approaches***. The conceptual premise of the first is an assumption that the social behavior is the result of recognized preferences and recognized choice by population. And in the course of such a choice the people are governed by a very limited set of the most meaningful for them parameters. In our case it means that people while making a decision of interregional migrations is reliant on the most obvious and close to their understanding social-economic parameters of life, directly participating in the formation of their regional preferences. The other approach is based on an assumption that migration is affected by a wide range of geo-socio-economic conditions , of which many latently affect the subjects of the migration and not always are recognized by them. (Very revealing is the work of Ben-chien Liu, who constructed in the end of s for all USA state on the basis of 100 economic, political and sical-cultural variables a factorial-regression model of migration).

The above mentioned hypotheses are supposed to be tested using as much as possible these two conceptual approaches. The former provides for "transparency", visual character and high interpretability of the results with, however, a certain narrowness of the approach caused by constrained space of the factors analyzed. The latter provides for complete and broad character but suffers unavoidably complicated character of both calculations and interpretation of the obtained results due to their representation in an aggregate form.

The methods of cluster, factorial-regression, discriminant analyses used in the project not only do perform description functions but at the same time serve an instrument for verification of the hypothesis about the start of "emergence – non-emergence" of the mechanism of interregional migrations appropriate to market-based systems. High values of the coefficients in the regression and discriminant models in factors of

"market" nature will evidence the emergence of market mechanisms of interregional migrations, low values about their absence.

For this purpose we are going to solve the following class of problems.

Within the former approach

1. To construct, using cluster analysis, migration typology of Russian regions on the basis of their key migration characteristics, give substantive description of the obtained types.
2. To construct a system of regression models of migration for different simulated functions (migration attributed) on the basis of key geo-social-economic parameters of Russian regions.
3. By method of discriminant analysis, to give evaluation of degree of conjunction of migration typology and key geo-social-economic parameters of Russia's regions.

Within the second approach

1. to make an in-depth search of the system of macro-social-economic parameters determining the picture of interregional redistribution of population with identification of the following units" investment, housing market, labor market, market of goods and services as well as a group of variables describing macroeconomic stability and economic profile of the regions.
2. To make factorial analysis of the space of macro-social-economic parameters affecting the results of interregional exchanged of the RF population.
3. To construct a factorial-regression model of migration increment of population in the RF regions.
4. To evaluate the degree of correspondence of all 89 RF subjects to the constructed factorial-regression model, to discover regions with maximum deviatin of

migration increment from general trends characterizing the mating of migratin and macro-social-economic parameters.

Within the whole project

To perform substantive interpretation of factors-regressors, making the highest influence on migration processes in Russia , and on this basis to discover contituent elements of the acting mechanism of interregional migrations.

The object of investigation is net migration in 89 RF subjects in the post-reform period.

The information base are materials of the official statistics published in the RF Goskomstat volume, including a two-volume collection "Regions of Russia", which appeared in 1997-1998.

Variables Used in Models of Migration

Migrations are described by many variables, and each of them can appear a modeled function or be employed for construction of migration typology of regions. Now we describe migration variables used in our analysis. They can be divided into two groups: absolute and relative.

The main idea in the use of **absolute migration variables** is that in this case all territories are as if equal in terms of their population size. Indeed, migrants, both arriving and leaving, strictly speaking, are indifferent (to a certain degree, of course) about the number of residents. What interests them is living conditions in this region comparing to other regions. Absolute migration variables show here the number of people to whom this region, for some reason or other, is attractive (flow of arrivals) as well as the number of those who are not satisfied with the life in it and, therefore,

motivated to leave it (flow of departures). The net migration presenting data on migration increment of the population, represents in a way the migration attractiveness of this territory, while the gross migration represents the intensity of migration ties, its involvement in interregional migration process.

Relative migration variables are estimated per one or 10 thousand population which makes it possible to compare the place and role of migration in the population formation on a particular territory.

Now a brief characteristic of each modeled migration variable.

Net-migration (NETTO) (in absolute terms) is the difference between arrivals in and departures from a region and characterizes the intensity of migration gain (loss) of regional population in the course of interregional migration measured in natural units.

Net migration rate (CNETTO) (migration gain coefficient) characterizes intensity of migration gain in interregional migration and is the relationship of migration gain to total population of the given area, permitting to appraise the role of migration in the population formation of a given territory measured per 10 thous. population. The deficiency of this indicator and of the previously mentioned one is that it does not contain data on the "intensity" of migration processes. For example, zero value of relative net migration is possible at both strong and weak migration relations of the given territory with other territories or even at the full absence of population exchange.

Gross migration (BRUTTO) is the sum total of region's arrivals and departures and characterizes the migration "sum" – total number of in- and out-migrants in a given region measured in natural units. Note that the same value of migration turnover is possible at both low departures and high arrivals and at high

departures and low arrivals. Gross migration specifies the net migration since it shows what migration turnover yields the particular net migration.

The same value of net migration can be the result of different migration turnover, "migration input". Overall, the higher migration turnover, the higher "input" in the given net migration.

Gross migration coefficient (CBRUTTO) characterizes the intensity of migration turnover in each concrete region, it is the relationship of gross migration to total population of the given territory computed per 10 thous. population.

The number of arrivals (ARRIVE) characterizes scales of in-migration measured in natural units.

The number of departures (LEAVE) from the region characterizes the scales of out-migration measured in natural units.

Coefficient of arrival (CARRIVE) characterizes intensity of migration gain, is the relationship of arrivals to the total territory's population, shows the "role" of in-migration in it , is a measure of the region's place of residence as a "lure" for people from other territories, is calculated per 10 thous. population.

Coefficient of departure (CLEAVE) characterizes the intensity of out-migration from the given region, is the relationship of the number of departures to the total territory's population, shows the "role" of out-migration in it, simultaneously reflects degree of its unattractiveness as a place of residence for its residents, is calculated per 10 thous. population.

The result of migration (RESUL) is the relationship of the number of departures to the number of arrivals and shows how many departures account for one arrival, or, in other words, how many times the outflow is as high as inflow. It is a significant feature of migration showing, in particular, the degree to which migrants

become entrenched in the territory. The higher this coefficient, the less "satisfactory" are migration processes on this territory, the higher the share of non-adapting migrants. High values of this indicator are typical, as a rule, of newly developing territories with unstable population.

Migration Typology of Regions in Post-socialist Russia

For of a comprehensive description of the migration situation it is reasonable to consider the whole system of these indicators in their mutual congruence and complementarity since each separate indicator characterises only one significant aspect in the migration process.

Typological analysis of the RF regions on the basis of migration characteristics is aimed at tabulation of the existing variety of regions to an easily observable number of migration types. With the help of cluster analysis all Russian regions were divided into six classes according to the following set of migration characteristics: 1) net migration, 2) net migration coefficient, 3) gross migration, 4) gross migration coefficient, and 5) migration results. Algorithm of clustering is a search of regions groups in which on the one hand the differences between regions within each group were minimum, on the other the "distances" between clusters maximum.

Table 1. Mean values of migration variables for migration classes (types)

	1	2	3	4	5	6
CNETTO	39.9	21.2	-22,38	-59,80	2,07	-42,87
NETTO	30148.2	6336.1	-2732,10	-628,95	1087,29	-4390,67
CBRUTTO	162.7	187.1	185,78	223,73	189,47	208,81
BRUTTO	121573.2	63326.4	41115,10	5550,35	17801,04	26299,78
RESUL	0.60	0.81	1,20	1,72	1,00	1,57

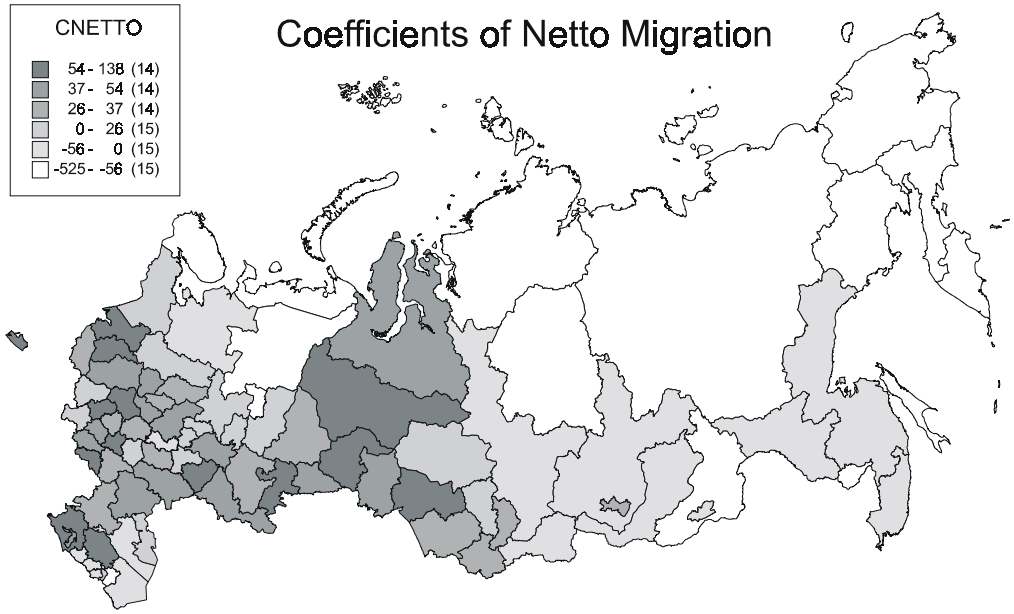

Fig 1. Coefficients of Netto migration in regions of Russia

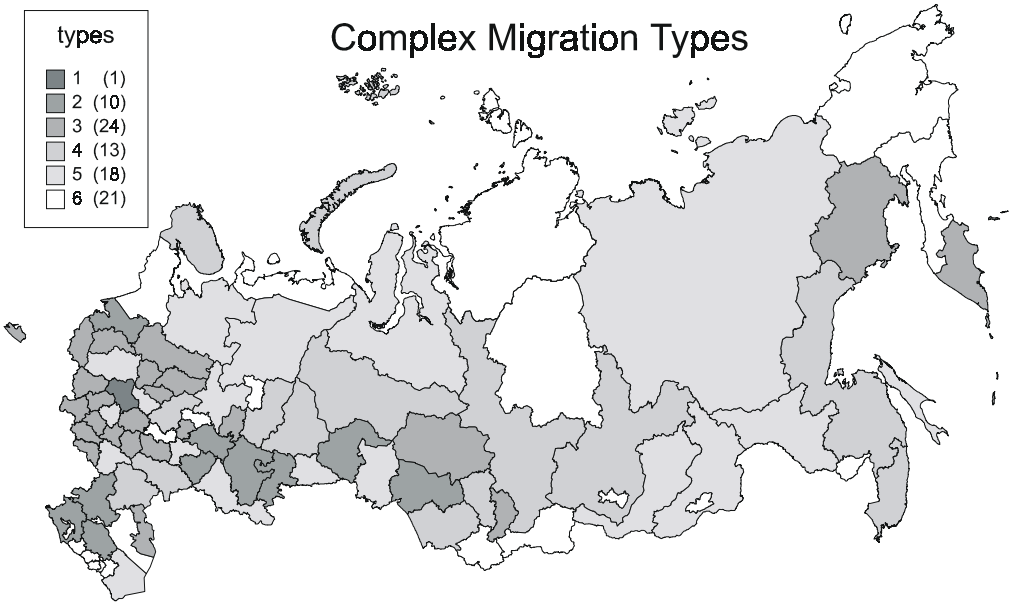

Fig. 2. Complex Migration Types

The first class has united the city of Moscow and the Moscow oblast. It is **the centre of migration attractiveness** in the country. Its migration parameters are unique. It works as a huge pump drawing in itself the population of other regions of the country providing at the same time the highest adaptability to the incoming population. This migration class has maximum highest absolute and relative sizes of net migration, the highest values of gross turnover against minimum coefficient of gross migration (163 per 10 thous. population). The latter circumstance points out to comparatively "weak" mobility of the established residents against maximum scale of gross migration: only 60 departures per 100 arrivals.

The second class is also **prosperous in terms of migration**, it includes 11 regions 9 of which are situated in the European part of Russia. The most part of this class are historically settled regions, traditionally attracting the population in virtue of various conditions: high living standards, favorable geographic location, mild climate or specific economic-industry profile etc. It includes 1) the city of St. Petersburg with the Leningrad oblast – the second capital city of Russia, 2) the Krasnodar and Stavropol krays and the Rostov oblast – a southern granary of Russia, 3) Tatarstan and Bashkortostan – republics with advanced economies, 4) the Tiumen oblast which at the starting period controlled, to a certain degree, the flows of oil dollars in the northern part of Western Siberia, as well as 5) the Novosibirsk oblast – a research, political, cultural and economic centre of Siberia.

According to all of its migration characteristics, this class is next immediately to the first class. But its parameters are much worse: migration gain is lower, the results of migration are also worse (81 departures per 100 arrivals), gross migration per 10 thous. population (187) is higher.

The third class, with equivalent migration exchange, is a kind of supporting structure in our migration typology. It unites the maximum number of regions – 24 and occupies the mid position among the identified classes by migration characteristics being bridge-like between satisfactory and unsatisfactory in terms of migration. This class is one of the most complicated and mosaic by its territorial configuration. In general, it resembles a wide, broken tape stretching from western to eastern borders of Russia from the Kaliningrad oblast as far as Kamchatka. The mid values of its migration parameters show a low, nearly "zero" relative net migration, that is a very low intensity of migration increment against mean values of the variables of migration turnover. The coefficient of migration result is unity, that is 100 arrivals into per 100 departures from the regions of this class.

Table 2. Distribution of regions in migration classes

1	2	3	4	5	6
Moscow	S. Petersburg	Vologodskaya	Murmanskaya	Komi	Kareliya
Moskovskaya	Krasnodarsky	Novgorodskaya	Nizhegorodskaya	Arkhangelskaya	Nenetzky okr.
	Tatarstan	Pskovskaya	Volgogradskaya	Vladimirskaya	Mari El
	Samarskaya	Bryanskaya	Saratovskaya	Tverskaya	Mordoviya
	Stavropolsky	Ivanovskaya	Permskaya	Tulskaya	Kalmykiya
	Rostovskaya	Kaluzhskaya	Sverdlovskaya	Kirovskaya	Adygeya
	Bashkortostan	Kostromskaya	Altaisky kray	Voronezhskaya	Ingushetiya
	Chelyabinskaya	Orlovskaya	Kemerovskaya	Ulyanovskaya	Kab.-Balk.
	Tyumenskaya	Ryazanskaya	Krasnoyarsky kr.	Dagestan	Kar.-Cherk.
	Novosibirskaya	Smolenskaya	Khanty-Mans. okr.	Kurganskaya	Osetiya
	Leningradskaya	Chuvashiya	Irkutskaya	Orenburgskaya	Komi-Perm.
		Belgorodskaya	Primorsky	Omskaya	Tyva
		Kurskaya	Khabarovsky	Yamalo-Nen.	Taimyrsky okr.
		Lipetzkaya		Buryatiya	Evenkisky okr.
		Tambovskaya		Chitinskaya	Ust'-Ordynsky
		Astrakhanskaya		Yakutiya	Aginsky
		Penzenskaya		Amurskaya	Jewish okr.
		Udmurtiya		Sakhalinskaya	Chukotsky okr.
		Tomskaya			Koryaksky okr.
		Khakassiya			Altai
		Kamchatskaya			
		Magadanskaya			
		Yaroslavskaya			
		Kaliningradskaya			

The fourth class, that of high absolute migration losses, (net migration – 2732) **against mean values of "relative" losses** (net migration coefficient is –22 per 10 thous. population) has a dispersed character of distribution. It includes 13 regions, six of which are in the European, seven in the Asian part of Russia. They are mostly regions with a rich industrial, cultural and scientific-technological potential, rich historical background. The indicator of migration result shows 120 departures per 100 arrivals.

The fifth class, an extreme of migration exodus. It subsumes 18 regions, 11 of which are in the European and 7 in the Asian part of Russia. It suffers maximum absolute and high relative migration losses (maximum among other classes net migration and one of highest net migration coefficient) against gross migration. The migration result indicates one and a half surplus of departures over arrivals.

The sixth class, labeled ethnical, fares the worst according to relative characteristics of migration. This class is a remote agrarian territory of Russia. It unites 20 subjects of the Russian Federation, and all of them are ethnical autonomies. It has maximum net migration coefficient (-69) and maximum gross migration coefficient (223). The out-movement from these regions, therefore, takes place against high gross migration: 172 departures per 100 arrivals. The factors underlying such a gloomy migration picture are extremely unfavourable socio-economic parameters in the development of these territories.

In conclusion, note that on the migration map of Russia there are three satisfactory and three unsatisfactory in terms of migration classes of regions. Satisfactory classes are concentrated in the European part of the country (31 regions out of 37, or 84%). Among unsatisfactory classes (fifty one regions) prevail either

ethnical periphery – agrarian remote areas, or northern and eastern periphery of the country (35 regions out of 51, or 70%).

Regression Models of Migration Based on Key Geo-Socio-Economic Parameters of RF Regions

The objective of this phase of the study was to build regression models of migration based on simple (non-aggregated) and, therefore, easily interpretable social-economic parameters of living standards, i.e. on factors of migration. In this system of regression equations 9 migration indicators each describing a particular feature of the migration process appeared alternately as the independent variable. The information bases were materials from the RF Goskomstat handbook "Regions of Russia", 1998.

In the selection of independent variables, we were guided by two considerations. One was a theoretical premise that people's migration decisions are based on the most obvious and comprehensible social-economic parameters of living conditions that make a direct effect on their regional preferences. Second was the known constraints imposed by regression models on the number of the used factors for the purposes of interpretation. According to this, we have selected the following independent parameters: one of an obvious socio-geographical character, three others pertaining to the situation in labour, housing and consumer markets, i.e. of a social-economic nature.

1. GEO is a variable based on geographical co-ordinates of the region (the sum of latitude and longitude). The inclusion of this variable in the regression equation is based on assumption that the lower their sum, that is the more westward and southward is the region's location, the higher is its attractiveness for potential

migrants and vice versa – the more northward and eastward it is, the less attractive it is for people. It is also the work of the factor of inclement natural conditions (the more northward, the more severe), and the work of the socio-cultural factor of remoteness from cultural Russian and European centres (the more eastward, the more remote). For Russian regions stretching over many thousand kilometres, it is a vital parameter.

2. HOUSE – price of 1 sq.m of flooring in the second-hand market. According to theory, high housing price in a market economy stimulates migration exodus from the region. Besides, it is reasonable to suppose that the higher is the price of housing, the more attractive is the region (owing to some other factors) as a place of residence and, at the same time, the more inaccessible it is for low-income residents of other regions.

3. LEVEL is the relationship of income to subsistence minimum. It characterises the regional stratification in real incomes. It is assumed that the higher this indicator, the more attractive is the region as a place of residence for residents of other regions.

4. UNEM is unemployment rate. It characterises the situation in the labour market. It is reasonable to suppose that the higher the unemployment rate in a region, the higher is the motivation of its residents for departure and the lower its attractiveness for probable arrivals.

Concrete values of regression equation parameters, correlation and determination coefficients obtained in modeling the migration variables by this set of independent geo-socio-economic parameters are given in Tables 3a and 3b. By calculations, over the whole set of regression equations , the coefficient of multiple correlation (R) varies within 0.58 – 0.80. It is known that the multiple correlation

coefficient (R) measures accuracy to which the resultant attribute can be expressed by regression equation (the closer is R to unity, the more accurately is the resultant attribute presented by this equation). In our calculations for most part of equations R was fairly high and, therefore, factors included in the regression equation significantly influence the migration parameters studied. The highest are R values for regression equations in which as dependent variables the following migration variables stand out – departure coefficient (0.80), gross migration coefficient (0.78) and net migration coefficient (0.77). At the same time, we should note that the lowest value of R was for net migration (0.58) and that the set of the independent geo-socio-economic factors selected by us gives a higher accuracy in description of intensity of departure from the region than of arrival into it.

Table 3a. Summary results of regression analysis

Dependent variable	GEO*	HOUSE*	LEVEL*	UNEM*	R	R^2	Adjusted R^2
NETTO	-0.38	0.18	-0.20	0.12	0.58	0.34	0.30
CNETTO	-0.74	0.11	0.04	-0.05	0.77	0.60	0.58
BRUTTO	-0.05	0.52	0.27	-0.01	0.75	0.56	0.53
CBRUTTO	0.68	-0.36	0.50	0.10	0.78	0.60	0.58
ARRIVE	-0.13	0.49	0.28	-0.04	0.75	0.57	0.55
LEAVE	0.06	0.53	0.24	0.02	0.70	0.49	0.47
CARRIVE	0.29	-0.4	0.75	0.10	0.60	0.36	0.33
CLEAVE	0.75	-0.29	0.31	0.08	0.80	0.65	0.63
RESUL	0.69	-0.07	-0.13	0.04	0.74	0.55	0.53

- β coefficients of regression equation.

Table 3b. T-statistics of regression analysis

Dependent variable	GEO	**HOUSE**	LEVEL	UNEM
NETTO	**-4.16**	1.40	1.53	-1.12
CNETTO	**-10.36**	1.13	0.39	-0.58
BRUTTO	-0.62	**5.07**	**2.59**	0.16
CBRUTTO	**9.63**	**-3.71**	**5.04**	1.25
ARRIVE	-1.74	**4.85**	**2.7**	-0.45
LEAVE	0.80	**4.79**	**2.18**	0.21
CARRIVE	**3.20**	**-3.26**	**6.00**	1.05
CLEAVE	**11.41**	**-3.16**	**3.32**	1.09
RESUL	**9.24**	-0.67	-1.19	0.54

Apparent and simple for substantive interpretation of the regression analysis results is also the determination coefficient describing the measure to which the modeled function is described by selected independent parameters. It shows what share of variation of the phenomenon under study (in our case, migration variables) is explained by the effect of factors included in the multiple regression equation. The total effect of all four factors is the most effective in explanation of variability of intensity of migration exodus from the region (at 65%), relative net migration (at 60%) and migration turnover intensity (at 60%); the least effective in explanation is variability of absolute net migration (at 34%) and of arrival intensity (at 36%).

Table 4. Correlation Matrix

Dependent variable	GEO	HOUSE	LEVEL	UNEM
NETTO	-0.42	0.41	0.39	-0.24
CNETTO	-0.76	0.27	0.20	-0.08
BRUTTO	-0.15	0.72	0.64	-0.30
CBRUTTO	0.69	-0.16	0.15	0.00
ARRIVE	-0.23	0.71	0.64	-0.32
LEAVE	-0.04	0.68	0.59	-0.27
CARRIVE	0.28	0.04	0.41	-0.07
CLEAVE	0.77	-0.22	0.01	0.04
RESUL	0.71	-0.28	-0.25	0.10

Absolute net migration. Modeling of absolute net migration by this set of variables was, as already mentioned, the least successful comparing to other characteristics of migration. But the multiple correlation coefficient representing closeness of relationship between the resultant and all factor attributes is still rather high (0.6). Turn now to the analysis of β-coefficient values. It shows at what part of the mean square deviation the resultant attribute is changing with the change of the appropriate factor attribute by its mean square deviation. Therefore, the standardised coefficients of multiple regression characterise *the rate of change of the mean value of dependent variable on each of the explaining variables at constant values of other*

variables included in the analysis; in other words, by β-coefficients it is possible to judge about intensity of influence of changes in individual explaining variables on the change of the dependent variable.

For this case it is possible to state that on the dynamics of the function modelled (that is when the absolute net migration stands as this function) the highest influence of all four factors, with regard to their variation level, is made by the factor of geographic location of the region (-0.38), since it is in correspondence with a β-coefficient the highest by absolute value. The role of real incomes level (-0.20), price of housing (0.18) and total unemployment rate (0.12) is markedly lower.

Successful was simulation on the basis of selected independent variables of **relative net migration**. In this case the total influence of all four factors on the variability of the modeled function was 60% (R square 0.60), and the multiple correlation coefficient showing the closeness of relationship between the resultant and all factor attributes was 0.8. In their turn, β-coefficients show that the undoubted leader by force of influence on the dynamics of relative net migration in the regression equation is the factor of geographic location of the region (β-coefficient was minus 0.74). In other words, the more northward and eastward is the region's location, the higher its migration losses, while the more southward and westward it is, the higher its migration gain (per 10 thous. population). *This fact shows that the socio-economic destruction of the state under political and economic crisis goes in the direction from outlying toward central areas. The first to become "numb" and die out are outlying territories of Russia, while the Centre which accumulates the resources of the regions keeps functioning. Migration flows, i.e. centripetal movement of population from remote areas to the centre, reflect only the spatial trend (a kind of*

regional succession) in the collapse of the state. Here a medical parallel comes to the mind: serious disease or demise involve numbness of limbs.

Quite a different picture is obtained with regression equation where the simulated function is **gross turnover**. It shows that migration boom is found where the housing price is high and the level of real incomes fairly high (incomes to subsistence minimum ratio). People are attracted to these regions but, perhaps being unable (or not willing) to settle down on the new place or to cope with the situation, are leaving. (β-coefficients for housing prices are plus 0.52, for real incomes plus 0.27). Aggregate influence of all four factors on the variability of this simulated function makes up 56% (R square = 0.56), and the multiple correlation coefficient showing the closeness of the relationship between the resultant and all factor attributes is 0.75. In other words, the regression equation coefficients show rather high calculation opportunities of this set of geo-socio-economic parameters for modeling the value of gross turnover.

Still more successful is the regression equation in description of **intensity of gross turnover (gross migration coefficient)**. But here the parameters are arranged by significance in a different way. The top place is occupied by geographical location of the region (β coefficient 0.68) and real incomes (β coefficient 0.50). And the intensity of gross turnover is increasing together with the change in the geographic location in the direction from south to north, from west to east, as well as with the rise of real incomes of the regional residents. The aggregate influence of all four factors on the variability of this simulated function is 60% (R square = 0.56) and the multiple correlation coefficient showing the closeness of the relationship between the resultant and all factor attributes is equal to 0.78. In other words, β-coefficients of the regression equation, multiple correlation and determination coefficients indicate high

calculation opportunities of this set of socio-economic parameters for simulation of intensity of gross migration.

Volumes of migration arrival into and departure from regions, according to regression equation coefficients, are modeled with a similar result by the same parameters: housing prices (β coefficients make up 0.49 and 0.53) and real incomes – incomes to subsistence minimum ratio (β coefficients are 0.49 and 0.53, respectively). Note that in both cases β-coefficients have positive sign, i.e. the volumes of migration exit from the territory as well as arrival into it are increasing with the rise of housing price and rise of consumer standard, that is these social-economic parameters pull and push the population at the same time. In general, this is a paradox.

Quite a different picture is obtained when the **modeled functions are coefficients of arrival and departure**. The dynamics of intensity of arrivals is the most influenced of all four investigated factors (with regard to their level of variability) by the factor of real incomes in the region (β-coefficient is 0.75). With improvement in real incomes the migration inflow increases. While in the case where the modeled function is intensity of migration exodus, the leading place in the system of the investigated geo-socio-economic parameters is occupied by the factor of geographic location: in the westward and northward directions migration exodus increases. Attention is drawn also to two circumstances. 1. With the rise of housing price the intensity of migration exodus is decreasing in regions, in other words, there exists a dependency of a non-market quality when people stay in regions with a high housing price (β-coefficient is minus 0.29). 2. The fact that intensity of movements decreases with the fall in real incomes (0.31) is difficult to interpret. *Maybe pauperization of residents in a number of regions leads to their being retained on the*

territory since migration in contemporary Russia is a fairly expensive undertaking that impoverished people cannot afford.

The result of migration measured by departures to arrivals difference is also fairly well described by regression equation. The highest influence on the dynamics of migration result is made by the geographic factor of all four investigated factors with regard to the level of their variability. And the more remote is the region from the centre in northward and eastward direction, the higher is number of departures per 100 arrivals (β -coefficient = 0.69). Results of decomposition of GEO using a number of social infrastructure parameters are presented in Appendix 1.

Of low significance are β-coefficients for factors of housing price and real incomes.

For estimation of the variables significance we can also use t-statistics (see Table 3b). Significant variables satisfy the following term: $|t| \geq 2$. As it can be seen from tables 3a and 3b the significance of β coefficients is always in accordance with t-statistics.

Appraisal of Migration Typology by Discriminant Analysis

For evaluation of the correlation between migration typology and geo-socio-economic parameters we used the method of discriminant analysis. The main point of this analysis is construction of functions that divide objects (regions) of different classes (migration types) on the base of and geo-socio-economic variables.

Table 5. Eigenvalues and Canonical Correlation

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	0.682	78.3	78.3	0.637

2	0.163	18.6	97.0	0.374
3	0.024	2.8	99.7	0.154
4	0.002	0.3	100.0	0.047

Table 6. Λ statistics of Wilks

Test of Functions	Λ Wilks'	χ^2	Degrees of freedom	Sig.
1 through 4	0.498	57.514	16	0.000
2 through 4	0.838	14.592	9	0.103
3 through 4	0.974	2.168	4	0.705
4	0.998	0.186	1	0.666

After preliminary analysis of eigenvalues, canonic correlation and Λ Wilks statistics (tables 6, 7), we decided to operate with four discriminant functions. The standardized coefficients of these functions are presented in table.

Table 7. Standardized Canonical Discriminant Function Coefficients

	Function			
	1	2	3	4
GEO	-0.114	0.744	0.516	-0.451
HOUSE	0.790	0.493	-0.595	-0.375
LEVEL	0.242	-0.107	0.839	0.790
UNEM	-0.170	0.754	-0.205	0.686

The result of carried out analysis is the accuracy of determining of region membership in migration typology by discriminant functions. The next table shows the percentage of coincidences for each migration type on the one hand and groups of regions obtained with discriminant analysis on the other.

Table 8. Migration types of regions and discriminant classification

	Predicted Group Membership %					
TIP	1	2	3	4	5	6
1	**100.0**	0.0	0.0	0.0	0.0	0.0
2	0.0	**72.8**	9.1	9.1	9.1	0.0
3	0.0	0.0	**87.5**	4.2	4.2	4.2
4	0.0	15.4	7.7	**76.9**	0.0	0.0
5	0.0	11.1	*44.4*	11.1	**11.1**	22.2
6	0.0	0.0	15.0	0.0	0.0	**85.0**

The migration type of region was correctly determined by its geo-socio-economic parameters in 68% of cases. It is rather high result especially if we compare it with the probability of random coincidence which is 16.7% (four times less). It can be seen from the last table that except the fifth type the percentage of coincidences is higher it means that prediction possibilities on the base of geosocioeconomic parameters are high. The most difficult is the fifth migration type, it has no personal analogue in discriminant division and its characteristics are close to the third type.

Conclusions

1. The analysis has shown that different migration variables are simulated by the regression model on the basis of the investigated independent variables (geographic factor, price of a sq. m of flooring in the second-hand market, real incomes, unemployment rate) with different degree of effectiveness. The best result is attained in description of intensity of arrival to the Russian regions (R=0.80, and R square=0.65). Very successful are results in modelling the intensity of gross and net migration (gross-coefficient and net-coefficient).

2. Analysis of regression equations has shown that the same independent social-economic factors with different intensity participate in simulation of different migration variables. It is necessary to mark a high degree of participation in all investigated regression equations of the geographic factor (leader in maximum values of β coefficients in 4 equations out of 9) as well as the factor of price of housing (leader in 3 equations). The factor of real incomes has come to the first place at one level. The factor of unemployment rate does not play any remarkable role in any regression equation. As is seen, the situation in the labour market has a very weak presence in modeling migration characteristics with the use of this set of parameters.

On balance, market factors (price of housing, real incomes) have leadership in 4 equations of 9, that is, in those equations where the simulated variable is alternately: gross migration turnover, volumes of arrival and departure and the intensity of arrivals.

3. It should be also noted that in modeling absolute variables of migration the most significant , as a rule, are parameters of living standard: housing price and real incomes (in three equations out of four) and in modeling the relative variables it is the geographic parameter (4 equations out of 5). *In other words, in normalization of migration characteristics "to population" the roles of social-economic parameters is extinguished and the role of the geographic factor increases.* For reasons of objectivity, however, it should be noted that the latter in this case carries in a coded form rather social-economic than purely geographic meaning. *Therefore, the geographic factor is very strong in modeling of almost all relative indicators of migration (net rate, gross rate, exodus rate, result) and of net migration volume. It absorbs in itself all contradictory trends of social-economic parameters affecting migration, extinguishes in itself errors and imperfection of their current statistical record, but remaining itself, at the same time, due to its nature, very objective and accurate. It shows concurrently that under political and economic uncertainty and disorder centripetal mechanisms of interregional migrations take place. Trying to escape the economic disorder, people are moving from east and north to the central regions.*

Methods of discriminant analysis testify a fairly high coordination between migration processes in the regions and geosocioeconomic parameters that describe situation on the regional house markets, real incomes and, accordingly, the

opportunities of successful diagnosing migration intensity with a compact set of variables .

Regression Analysis based on the Expanded Set of Social-economic Factors of Migration

1. Matrix of Pair Coefficients

Regression analysis of migration can be also made on the basis of aggregated factors obtained for a wider set of macrosocioeconomic parameters. This approach will provide, as was mentioned, a deeper understanding of the problem under investigation. We made an attempt at it. As independent variable 32 macroparameters were selected; as the modeled function NM (relative net migration or net migration coefficient) was used. The information base was the data of the RF Goskomstat handbook "Regions of Russia", 1997.

Now turn to the analysis of the coefficients of pair correlation calculated both for the whole totality of regions and for 10 classes of them discerned according to the variation of the values of the net migration coefficient – NM. The concrete values of these coefficients are given in Table A2.1 (Appendix 2). For a smaller number of objects (in our case for 10 classes) these values obviously are several times that for the total set of 89 RF subjects.

Block of Investments

As was shown by the analysis, an important place in the present mechanism of interregional migrations is occupied by investment policy. But as it turned out the most significant are not the volumes of investments themselves but their structure and direction.

In the investment block, 2 interconnected macroeconomic parameters draw our attention by their close relationship with the net migration (NM): 1) share of investments in municipally-owned fixed capital (-0.85) and 2) share of investments in privately-owned capital (+0.78). They affect migration (NM) in opposite directions. The higher is the support of private capital in the regional investment policy, the more attractive is this region in terms of inmigration. And vice versa: the more investments are made in municipally-owned fixed capital, the less balanced in the regional migration exchange is this subject of RF Federation. These data point to emergence of market elements in the mechanism of inter-regional migration.

The second group of investment parameters characterises reproduction structure of investments in fixed capital by industrial purposes of investments, in other words, predominantly 1) in technological re-equipment and reconstruction of operating enterprises or 2) in expansion of the existing enterprise, or 3) in new construction. In this group of parameters the highest closeness of migration (NM) is with investments in expansion of the existing enterprises. It seems that the most attractive for the population of Russia are regions where priority is given to expansion of existing production. At the same time regions where priority in investment activity is given to new construction or reconstruction which is vitally important from the long-term perspective do not meet the proper response from the population. This is a specific feature of the moment - much like the 1960s hippies' slogan «at this place and immediately».

Similarly paradoxical at the first glance seems the revealed negative relationship of international per capita investments with migration increase of population (-0.32). This relationship is mainly due to northern and eastern regions of Russia where large foreign investments are made in reconstruction of old enterprises which is accompanied by workers' release, unemployment and closures of a great number of exhausted fields of resources.

On balance, however, per capita investments have if only small but positive closeness of relationship with migration. In other words, growth of investments in regions is accompanied by insignificant «improvement» in the net migration coefficient. This situation too can be regarded as a small indicator of the presence of market elements in the mechanism of inter-regional migration of population.

Housing Market

Macroeconomic parameters characterising the state of housing market also influence migration processes. The most significant is direct positive dependence of the migration output and new housing construction measured by per capita sq. meters (0.79), in other words, with increased new housing the attractiveness of the region is increasing. And this seems natural. We should note that such positive relationship is time-stable in Russia and can be traced back to the 1960s as well as the 1970s and 1980s (Korel L.V. , V.S. Tapilina, and V.A. Trofimov, 1989). At the same time, a very high negative relationship (-0.90) is with parameters characterising the dynamics of housing «demand» satisfaction, i.e. with the percentage of households receiving accommodations to those put on housing waiting lists. Hypothetically, it can be supposed that the inverse relationship takes place here under the following circumstances. First, vacation of state-owned housing after migration exodus of population from the region which mechanically increases the speed of moving along

the waiting list. Such a situation is possible, for example, in northern and eastern regions of the country with a relatively high percentage of job-related accommodations not subject to privatisation etc. On the other hand, each region has its own standards of putting people on housing waiting lists. It can be its average per capita housing provision of 5 sq. m, 10 sq. m, 12 sq. m etc. which, under equal conditions, produces waiting lists of different length. Therefore, high volumes of per resident new housing construction can be accompanied by slow movement along waiting lists in the region and vice versa. This means that regions more favourable with respect to their housing provision can have worse variables of waiting list movements which leads to inverse relationship between waiting list movements speed and migration and, therefore, to negative correlation relationship. Two other variables, in their turn, 1) housing provision (sq. m per resident) and 2) percentage of households on housing waiting lists, have positive but very weak correlation with the migration output (0.12 and 0.04, respectively).

Labour Market

In the system of factors characterising the condition of labour market in regions the strongest relationship with migration is shown by general unemployment rate (-0.75). This relationship is negative, which is obvious. In other words, the higher unemployment rate in a region, the less attractive it is for the population of Russia as a place of permanent residence. It should be noted that two other parameters of this block, that is registered unemployment rate and coefficient of labour market tightness (number of job seekers per one vacancy) also show a high inverse relationship with migration increase of population in regions (-0.70 and -0.66). (This is not at issue with

what was said earlier because the revealed relationships are not steady in time, and in 1996 became weaker than in 1995).

Market of Goods and Services

Among macroeconomic parameters characterising the state of regional markets of labour and services, of the highest interest, from the viewpoint of positive effect on migration processes, are the following: 1) level of meat and meat products consumption in a region (note that the effect of this factor, according to our findings, is similar to that of the factor of new housing construction which is also a long-standing factor) (0.67), 2) the percentage of foods in money expenditures of the population (0.49) and 3) the ratio of monetary incomes to subsistence minimum (0.41). While the direct relationship of the first and third parameters with migration is obvious (it is natural to see that the cheapness and accessibility of meat products and marked excess of population's incomes over the size of the subsistence minimum are attractive for the population), then the second requires some comments. In our view, the low share of foods in money expenditures of the population is typical of depressive regions where household production of foods is widely spread. The money available to households is spent in such regions, as a rule, almost exclusively, on purchases of clothes, transport, housing rent etc. A high outmigration only weakly compensated by arrivals is typical of such subjects of Federation. In this case it seems reasonable to suppose that , along with inclusion in the regional mechanism of migrations of variables characterising the state of the market of goods and services, some factors-anomalies began to operate in the migration mechanism caused by the crisis economic situation which compelled the population to take up an archaic «primordial-subsistence» type of the economy - «pre-market» and «pre-socialist» one.

Three other variables of this block of macroeconomic parameters have inverse relationship with migration result. It is per capita retail turnover and per capita expenditures and incomes of the population in the region. This situation is caused predominantly by the existence of price bands: high prices of goods and services in northern and eastern regions which, as a rule, are losing their population in migration exchange and relatively low prices of these goods and services in central and southern regions of Russia due to which they are gaining population.

Macroeconomic Stability and Region's Economic Profile

Macroeconomic parameters of this group also make impact on the course of migration processes. One series of factors have direct positive relationship with the migration result, the other inverse (negative). Among the factors of the first group there are profitability of production (0.67), percentage of fixed capital in private ownership (0.69), percentage of population employed in the private sector of the economy (0.75). In other words, the higher is the development of new forms of ownership in a region and the higher profitability of its enterprises' products, the more attractive it is for the population of Russia. On the other hand, the receivables and payables of industrial enterprises of the subjects of Federation (per one industrially employed) like also industrial output per one industrially employed and percentage of unprofitable enterprises in total enterprises of the region have the negative inverse relationship to the migration increase of the population. The correlation coefficients in this case make up -0.85, -0.51, and -.97, -039, respectively. As is seen the extensive-oriented economy not accompanied by efficiency of production pushes a number of RF subjects into a class of low attractive regions. This can be interpreted as emergence of market elements in the present mechanism of inter-regional migration exchange.

As is seen, at present in the regulation of migration flows in Russia three groups of factors are involved. Some of them clearly are of a market nature, for example, are developing new forms of economic activity, diversified forms of ownership (private ownership, profitability level of industrial products etc.). The other are of a «universal», or, more precisely, mixed character: being very much like rudiments of the old system, old mechanism of inter-regional redistribution of the population of pre-reform Russia, where a noticeable role was played, in particular, by regional differentiation of living standards, these features, on the other hand, are also possible in a market environment, so they are as if «neutral» with regard to market. In other words, their presence in the mechanism of inter-regional migration is equally possible both in market and in distribution economy (for example, new housing per capita, consumption level of meat products). Still others carry the elements of crisis situation, drawing the clock hands far backward, to the primitive economy (self-provision of foods). Which of these are the strongest at this time?

The performed analysis brings us to the idea about a need to identify the basic, most significant, principal (not derivative) macroeconomic parameters that are, first, actively participating in the mechanism of the formation of migration flows and not duplicating each other, second, the most vivid and socially significant, holding the most «voluminous, comprehensive» social loading (for example, the relationship of monetary incomes to subsistence minimum among the RF subject population), third, containing a possibility to be directly «controlled» by the society. In the result of these criteria (premises) for regression-factor analysis we have selected the following macroeconomic parameters. Investment block: 1) percentage of investments in fixed capital in private ownership (0.78); 2) percentage of investments in fixed capital for expansion of existing enterprises (0.76). Housing market: 3) new housing

construction, sq. m per resident, (0.79); labour market: 4) general unemployment rate (-0.76). Market of goods and services: 5) Consumption of meat products (0.67), 6) Share of foods in money expenditures of the population. Macroeconomic stability and economic profile of the regions: 7) enterprises back payment of wages (-0.51), 8) profitability of the realised industrial products (0.67), 9) percentage of fixed capital in private ownership (0.70), 10) percentage of population employed in private sector of economy (0.74). It is these factors that are used in the analysis below

In conclusion of this section it should be noted that in present Russia the registered flows of refugees less depend on the above macroeconomic parameters than the «normal migration» though in fact it follows its trends, that is, movements of refugees while following the general migration patterns do introduce in them some noises (see Table 1).

2. Factor and Regression Analyses

The task of numerical description of migration processes in present Russia by a regression model which would most completely include all presumably significant migration factors, MEP, meets with a number of difficulties. The point is that signs (directions) of relationships and values of regression coefficients strongly depend on the extent to which the recorded variables correlate among themselves. The use of closely interrelated attributes (which are simultaneously «holders» of particular characteristics and their «dummies») as variables leads to distortion of final results (Mosteller F., Tuki G., 1982). A strong correlation between explaining variables ultimately greatly reduces the accuracy of the evaluation of the regression parameters, dispersion of regression coefficients etc. The consequence of this lower accuracy is unreliability of regression coefficients and partly unacceptability of their use for

interpretation purposes as a measure of effect of the appropriate explaining variable on the dependent variable (Ferster E., Renz B. , 1983). The most adequate and accurate representation of the character, strength and direction of relationships between function and variables is found in «factor models». Factors obtained with the help of such models that are linear expression of the initial variables can be more correctly used as regressors. This kind of work is the object of our further exposition.

Factor and regression analyses are divided into several stages:

1. Preparation of the correlation matrix of variables.
2. Identification of initial factors and their rotation (finding factor loadings and rotation matrix).
3. Standardisation of the initial statistical data (transition to variables of the $t = \frac{x - \overline{x}}{\sigma}$ kind where σ is root-mean square deviation).

Factor scaling. Computation of factor values for each region.

4. Building regression equations based on the factor model. Computation of coefficient of determination.

On the basis of the data from 89 RF subjects for a space of variables consisting of 32 macroeconomic parameters, equations of multiple regression for different numbers of factors were obtained. Fig. 1 shows the relationship of the value of determination coefficient [Seber, 1977] to the number of factors. In this case this coefficient is square of the correlation coefficient between tabular values of net migration (NM) for all regions and NM value calculated with the help of the obtained regression equation with the pre-set number of factors in the factor model.

Curves b and c obtained for a similar problem can serve as a kind of a test of the chosen procedure where as MEP values of some random numbers were taken (b is mean for several of such solutions for different generators of random numbers, c is an example of one of «random» relationships).

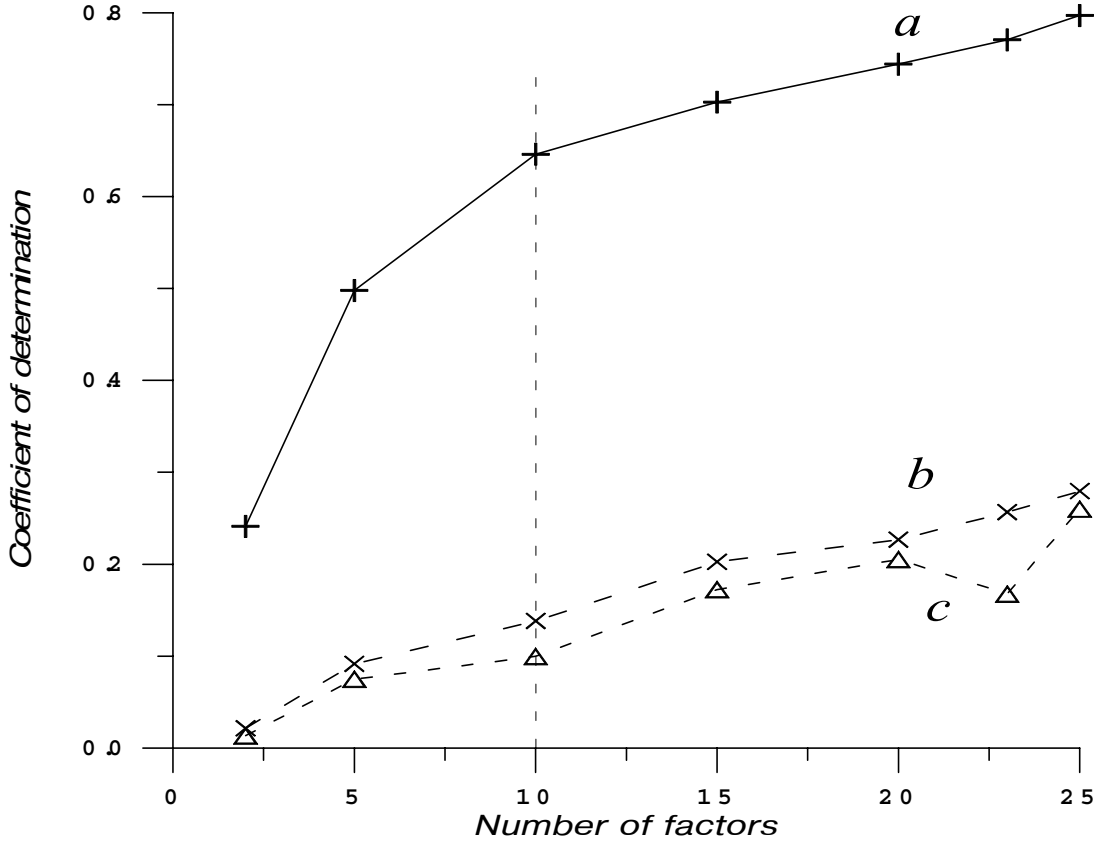

Figure 3. Determination coefficients for the regression model with different numbers of factors. a - real values of MEP, b - mean of random sets, c - example of random set.

Conclusions from the calculations shown in the figure are as follows:

1. Inter-regional migration in present Russia in the context of transformation can be, to a moderate degree of accuracy, be described by the regression model on the basis of macroeconomic parameters. In other words, migration processes in the transition

period follow certain macroeconomic patterns and are far from haphazard (which is indicated by a considerably higher coefficient of determination for practically any number of factors in the «real» model).

2. The equality of inclination angles of the relationship for «real» and «random» models beginning with 10 factors shows that the maximum possible optimum set of factors is limited to 10. Further increase of their number does not lead to identification of new sets of variables and is, therefore, not correct (for the chosen space of variables and used statistics).

3. The value of the coefficient of determination showing what part of variation of the factor under study (NM) is explained by the effect of factors included in the regression equation for the case of, for example, five factors makes 50%. This means that about 50% of variability of the resultant attribute (NM) is explained by the action of just these factors.

Regression Model for 10 basic macroeconomic and social parameters

In the result of factor analysis of the space of variables based on both quantitative evaluations and the criterion of factors interpretability 4 factors were extracted.

After the procedure of orthogonal rotation the following matrix of rotated factor loadings was obtained:

	1	2	3	4
1. Share of investments in fixed capital that is in private ownership	**0.668**	-0.074	0.088	0.289
2. Share of investments in fixed capital for expansion of functioning enterprises	0.168	0.087	**0.625**	0.040

3. New housing construction	0.078	-0.200	0.309	**0.486**
4. Total unemployment rate	-0.078	**0.720**	-0.338	-0.156
5. Consumption of meat products	0.195	-0.161	**0.663**	0.013
6. Share of foods in money expenditures of the population	0.194	**0.752**	0.129	0.044
7. Enterprises unpayment of wages	-0.151	0.074	0.121	**-0.580**
8. Profitability of the realised industrial products	0.162	-0.454	**0.526**	0.066
9. Share of fixed capital in private ownership	**0.755**	0.115	0.195	0.006
10. Percentage of population employed in private sector of economy	**0.776**	0.029	0.240	0.112

As is seen, in the space of variables under analysis the factor complexities of variables (number of factors for which factor loadings of the variable assume high values) can be taken as equal to 1 [J. Kim, Ch. Mueller, 1986]. This means that the objective of the factor analysis, i.e. reduction of a large number of dependent variables to a small set of relatively independent factors, has been achieved. Now we pass on to substantive interpretation of the obtained factors.

In the first factor the highest loadings are with MEP characterising the establishment of new forms of economic activity in the RF subjects, the emergence of the private sector. These parameters include 1) share of investments in fixed capital of private ownership, 2) share of fixed capital in private ownership as well as 3) share of population employed in the private sector of economy. It seems that just this factor will play the principal role in testing our hypothesis about the presence of a «market component» in the mechanism of inter-regional migration in present-day Russia. We will call this factor «emergence of new forms of economic activity».

In the second factor dominate social-economic parameters describing , on the one hand, the situation in the labour market (general unemployment rate), on the other, the character of consumption standards of the population (the share of food products in money expenditures) that are closely related to each other. The

relationship between them is quite clear: the higher unemployment level in a region, the poorer is its residents, the more are they oriented to self-provision in the sphere of consumption (potatoes and other vegetables growing is sometimes the only source of food provision in such regions).

On the whole, this factor is of a mixed nature. While the first parameter can be viewed as an indicator of the situation in the labour market and can be appropriately used for verification of our hypothesis, the other points rather to people's transition in many RF subjects to subsistence way of life which is inherent in any degrading social system whether of a market or distribution system. This factor is called «level of living».

The third factor joins together closely related parameters of economic and social aspects. The economic ones include: 1) share of investments in fixed capital directed to expansion of the existing enterprises and 2) level of profitability of the realised industrial products. The social characteristics include per capita consumption of meat products in a region (kg). The joining together the first two variables seems logical. Enterprises with a high profitability of industrial output, as a rule, are interested in expansion of the functioning production and are willing to pursue investment policy of this kind. In addition, in regions with highly efficient, profitable enterprises the living standards of residents are high enough which is reflected in their full-value protein nutrition (a high level of consumption of meat products). In principle, by its nature this factor also could be used to prove or disprove our chief hypothesis about «emergence - non-emergence» of the market mechanism of inter-regional mechanism of population redistribution in present-day Russia. According to the market laws, highly profitable productions should be the most attractive for the population. In the economy of a distribution type in pre-reform Russia such

relationships were violated. Profit was exempted from producers, accumulated in the Centre, after which was redistributed in the interests and under pressure of lobbying sectoral and regional groups. This factor will be referred to as «investments and profitability».

Finally, the fourth factor with the highest factor loadings includes the following variables: 1) new housing, characterising the scales of housing construction in the region as well as 2) wages unpayment by industrial enterprises. Joining together these variables in a single factor shows their high relatedness. Of depressive regions typical is combination of low level of housing construction and high outstanding debts of wages in enterprises. Of well faring regions intensive housing construction and minimum unpayments of wages is typical. This factor is a kind of indicator of «catastrophic - non-catastrophic» character of the present economy of the RF subjects. At the same time, note that in this factor a significant element of the former, pre-reform mechanism of inter-regional migration of the Russian population has been present (preserved) which is scales and intensity of housing construction. Therefore, with a certain amount of confidence it is possible to interpret this factor as a symbiosis of one of rudiments of the former mechanism of inter-regional migration of Russia's population with a new social-economic phenomenon demonstrating the collapse of the Russian economy. This factor will be referred to as «conventional-innovational».

The equation of multiple regression obtained on the basis of 4 factors in the space of 10 variables looks as follows:

$$NM = -11 + 51.7 \cdot f_1 + 25.6 \cdot f_2 + 93.2 \cdot f_3 + 79.6 \cdot f_4$$

	1	2	3	4
Coefficients in the multiple regression equation	51.7	25.6	93.2	79.6
Paired coefficient of factor correlation	0.36	0.1	0.45	0.35

with NM				

Coefficient of determination for the obtained equation - **D = 0.4** **(** coefficient of paired correlation of the initial NM data with calculated ones is $R = \sqrt{D} = 0.65$). It should be noted that the value of the coefficient of determination naturally depends on the number of units being analysed. Thus, the coefficient of determination calculated for regression equation obtained both on the basis of the same MEP for 10 above described migration classes of regions has higher values (**D_{10} = 0.8**).

Then we thought it reasonable to test all 89 RF subjects for the correlation of their net migration with MEP built regression equation. This procedure has made it possible to reveal 13 regions with maximum deviations of net migration (NM) from general trends characterizing the conjugation of NM and MEP. These are the Archangel oblast, the city of Moscow, the Ryazan oblast, Chuvashia, Kalmykia, Igushetia, Kabardino-Balkaria, Chechnya, the Stavropol kray, the Kemerovo oblast, Yamalo-Nenets AO, Tyva and Khakasia. These RF subjects present migrations of a special kind. They seem to be caused by their specific macroeconomic parameters as well as by ethnical and polical-geographical factors left out from the model. In its turn, the present model describes most precisely the Leningrad, Novgorod, Lipetsk, Astrakhan, Kurgan oblasts, the Khabarovsk and Altay krays, Bashkortostan, Mari El etc. These regions are the most typical carriers of the national trend of migration causal relationship with the processes of macroeconomic parameters.

Conclusions.

The regional analysis of migrations in relation to social-economic trends in the subjects of the Russian Federation by use of mathematical-statistical apparatus has permitted to reveal the following.

In Russia under transition there is a certain relationship between migrations and macrosocioeconomic parameters of regions. The results of interregional population redistribution is described by a system of regression models built on the macrocharacteristics of the regions with a satisfactory accuracy. Therefore, with a high share of confidence, it is possible to state that at present migrations "obey" certain macrosocioeconomic patterns and regularities and are far from having a disorderly, random, unspecifiable character, the latter however also takes place.

It is true that no internally harmonious, coordinated mechanism of interregional migrations exists in "a pure form" today in Russia. The country is in *transition,* its economy is changing from inefficient distribution-socialist type to efficient market system, and in politics from authoritarian type to stable democracy, and so far it could not (had no time) to develop a mechanism of interregional human distribution which would be fully appropriate to market-based democratic system. Its present migration mechanism also is in a state of *transition*. It is a combination (or symbiosis) of three fundamentally different mechanisms serving different social-economic processes in the society or its segments.

The first mechanism is appropriate to the emerging market relations and, accordingly, serves their needs. Regulators of this mechanism reflect regional differentiation in the development of new forms of economic activity and are generated by transition from distribution-socialist to market forms (such parameters

are presented in the 1st and 3rd factors). This group of factors makes the strongest influence on migrations. And regions that are advanced in market elements are the most attractive for migrants. At the same time this group of regulators testify that the mechanism of interregional migration (MIM) has already included market elements.

The second mechanism is of a residual and, concurrently, backward nature and concentrates in itself rudiments – remaining elements of the former (pre-reform) mechanism of interregional migrations. It was based, as mentioned, on regional differentiation in living standards and intensity of housing construction. This group of regulators, at present like before, still plays an important role in the formation of migration flows.

And, finally, the third mechanism is of an "abnormal-emergency" character, it is a response to the collapse of the current economy. It has an obvious geographic attribute. This mechanism is reflection of social-economic deformities of the transition period, combining regulators of a "crisis" nature (for example, back wages, etc.). Their role, by estimates, also lends itself to mathematical description, but not very much.

The specific simultaneous functioning of the three mechanisms of migration have caused as a resultant a rather dramatic (by demographic, political, economic, defense consequences) picture for the state of interregional redistribution of population – a mighty centripetal direction of migration flows. It is manifested in prevalent concentration of the population in traditionally attractive areas of the European part of the country (the city of Moscow, Moscow oblast, the city of St. Petersburg and the Leningrad oblast, the south granary of Russia - the Stavropol and Krasnodar krais, the Rostov oblast) and depopulation of its outskirts – the agrarian national periphery, as well as the East and North of the country.

In the future, after the management of crisis events in the economy, the "market' constituent will be strengthened in the mechanism of interregional migration and, at the same time, the action of the regulators of a rudimentary, backward and of abnormal-emergency character caused by difficulties of the transition period will be weakened. But if the economic depression in Russia is prolonged and the present disparities increased, migrations will lead to irreversible, final depopulation of eastern and northern regions that will put in doubt its possibility to perform state control of this territory.

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Appendix 1 Decomposition of GEO

One of the possible ways to explane the dominant role of the GEO factor in regression analysis is to testify the hypothesis of correlation between GEO (i.e. geographic location) and development of social infrastructure. We assumed that migration flows from the nothern and eastern parts of Russia are due to the low level of social infrastructure in these regions. However the attempt to associate GEO with a number of obvious social parameters (see table A1) failed.

Table A1. Decomposition of GEO (β and t coefficients in regression)

	β	t – coefficient
DOC	0.147	1.181
BED	0.457	**4.211**
CHILD	0.007	0.075
STUD	-0.277	-1.824
THEATRE	-0.021	-0.160

DOC – number of doctors per 10000 population
BED – number of hospital beds per 10000
CHILD – number of places in kindergardens (places per 1000 children)
STUD – number of students per 10000
THEATRE – theater attendance per 1000

As it can be seen from the table the only parameter that has a correlation with GEO is the number of hospital beds but the dependence is inverse. That is to say that east and north regions seems to be better supplied with the hospital services.

Appendix 2

Table A2.1 10 migration classes of regions of 89 RF subjects

№	Regions	NM per 10 000
	Group 1	-978, -199
4	Nenetsky A.O.	- 246
48	Chechen republic	-649
74	Evenk A.O.	-243
81	Chukotsky A.O.	-978
85	Kamchatka obl.	-280
86	Koryaksky A.O.	-270
87	Magadan obl.	-759
88	Sakhalin obl.	-301
	Group mean	-468
	Group 2	-200, -49
2	Komi rep.	-101
6	Murmansk obl.	-148
34	Kalmykia rep.	-69
57	Komi-Permyak A.O.	-57
73	Taimyr A.O.	-171
78	Aginsky A.O.	-126
79	Saha (Yakutia) rep.	-182
80	Jewish A.O.	-66
83	Khabarovsk kr.	-69
	Group mean	-110
	Group 3	-50, -9
3	Arhangelsk obl.	-31
45	Kabardino-Balkaria rep.	-33
46	Karachaevo-Cherkessia rep.	-11
70	Tyva rep.	-16
76	Ust-Ordynsy A.O.	-35
77	Chita obl.	-25
82	Primorsky kr.	-42
84	Amur obl.	-11
	Group mean	-26
	Group 4	-10, +14
7	Saint-Pitersburg	+13
25	Mordovia rep.	+11
64	Omsk obl.	+8
67	Khanty-Mansiisky A.O.	+1
69	Buryatia rep.	0
72	Krasnoyarsk kr.	+7

75	Irkutsk obl.	+7
	Group mean	+7
	Group 5	+15, +29
1	Karelia rep.	+23
16	Moscow	+28
26	Chuvashia rep.	+28
27	Kirov obl.	+18
54	Kurgan obl.	+15
56	Perm obl.	+18
59	Chelyabinsk obl.	+28
65	Tomsk obl.	+23
	Group mean	+24
	Group 6	+30, +44
5	Vologda obl.	+41
24	Mariy El rep.	+35
35	Tatarstan rep.	+40
38	Penza obl.	+44
42	Adygeya rep.	+40
53	Udmurtia rep.	+32
58	Sverdlovsk obl.	+36
61	Altai kray	+34
62	Kemerovo obl.	+30
66	Tyumen obl.	+34
	Group mean	+37
	Group 7	+45, 56
13	Ivanovo obl.	+46
15	Kostroma obl.	+52
18	Orel obl.	+52
19	Ryazan obl.	+47
28	Nizhny Novgorod obl.	+56
33	Tambov obl.	+53
52	Bashkortostan rep.	+55
55	Orenburg obl.	+56
63	Novosibirsk obl.	+56
	Group mean	+53
	Group 8	+57, +69
11	Bryansk obl.	+68
17	Moscow obl.	+60
22	Tula obl.	+59
23	Yaroslavl obl.	+65
31	Kurgan obl.	+68
40	Saratov obl.	+57
41	Ulyanovsk obl.	+65
47	Alania rep.	+62
51	Rostov obl.	+58
71	Khakassia rep.	+62
	Group mean	+62
	Group 9	+70, +89
9	Novgorod obl.	+79
12	Vladimir obl.	+70
20	Smolensk obl.	+84
30	Voronezh obl.	+71

32	Lipetsk obl.	+78
36	Astrakhan obl.	+79
39	Samara obl.	+82
43	Dagestan rep.	+73
60	Altai rep.	+70
	Group mean	+76
	Group 10	+90, 500
8	Leningrad obl.	+120
10	Pskov obl.	+95
14	Kaluga obl.	+109
21	Tver obl.	+105
29	Belgorod obl.	+129
37	Volgograd obl.	+90
44	Ingushetia rep.	+493
49	Krasnodar kray	+132
50	Stavropol kray	+91
68	Yamalo-Nenets A.O.	+105
89	Kaliningrad obl.	+113
	Group mean	+143

Table A2.2.

№	Macroeconomic parameters (factorial indicators)	Paired correlation coefficients 1*	2*	3*
	Investments			
1	Per capita investments in fixed capital (roubles)	.23	.04	.09
2	Structure of investments in state-owned fixed capital , %	- .32	- .21	- .19
3	Structure of investments in municipally-owned fixed capital, %	- .85	- .12	- .08
4	Structure of investments in private fixed capital, %	.78	.33	.25
5	Reproduction structure of investments in fixed capital by industrial purposes: technical re-equipment and reconstruction of functioning enterprises, %	.39	.06	.08
6	Reproduction structure of investments in fixed capital by objects of industrial purpose: expansion of the functioning enterprises, %	.76	.39	31
7	Reproduction structure of investments in fixed capital by industrial purposes: new construction, %	- .33	- .01	- .02
8	Per capita foreign investments , dollars	- .47	- .13	- .10
	Housing Market			
9	Per capita new housing construction, sq. M	.79	.34	.26
10	Housing provision, sq. per resident	.12	- .10	- .15
11	Percentage of households on housing waiting list, %	.04	0	.04
12	Percentage of households who received accommodation (out of those on waiting list)	- .90	.64	- .59
	Labour market			

13	General unemployment rate, %	- .75	- .18	- .19
14	Registered unemployment rate, %	- .70	- .11	- .06
15	Job seekers per vacancy, persons	- .66	- .08	- .02
	Market of goods and services			
16	Per capita retail turnover, thous. Roubles	- .17	- .10	- .04
17	Annual per capita consumption of meat and meat products, kg	.67	.32	.27
18	Ratio of money incomes to subsistence minimum, %	.41	.12	.11
19	Per capita incomes, roubles	- .66	- .38	- .30
20	Per capita expenditures, roubles	- .23	- .13	- .08
21	Share of foods in money expenditures, %	.49	.28	.18
22	Share of non-foods in money expenditures, %	.11	- .03	.01
23	Population per doctor, persons	.04	.06	.14
	Macroeconomic stability and economic profile of region			
24	Percentage of unprofitable enterprises in industrial production, %	- .39	- .20	- .14
25	Enterprises' payables per one industrially employed, roubles	- .85	0	.04
26	Enterprises' receivables per one industrially employed, roubles	- .51	- .28	- .23
27	Profitability level of the realised industrial goods, % (profit to cost ratio)	.67	.30	.23
28	Industrial output per one industrially employed, roubles	- .97	- .36	- .31
29	Percentage of fixed capital in private ownership, %	.69	.31	.26
30	Percentage of population employed in private sector, %	.75	.42	.36
31	Percentage of population employed in mixed-ownership sector, %	.39	.11	.16
32	Crimes recorded per 100 thous. Population	- .28	- .10	.01

1 correlation coefficient for 10 classes of regions of 89 RF subjects*

2 correlation coefficient for 89 RF subjects (NM including movement of refugees)*

3 correlation coefficient for 89 RF subjects (NM net of refugees' movement)*

Table A2.3 Correlation matrix of macroeconomic parameters

	1	2	3	4	5	6	7	8	9	10
1	1.000	.235	.214	.212	.179	.084	-.244	.117	.497	.586
2	.235	1.000	.073	-.244	.413	.220	-.042	.322	.212	.254
3	.214	.073	1.000	-.272	.348	-.055	-.234	.280	.097	.197
4	-.212	-.244	-.272	1.000	-.335	.518	.054	-.526	-.041	-.108
5	.179	.413	.348	-.335	1.000	-.029	.127	.375	.256	.360
6	.084	.220	-.055	.518	-.029	1.000	-.103	-.225	.293	.194
7 -	-.244	-.042	-.234	.054	.127	-.103	1.000	.126	-.118	-.151
8	.117	.322	.280	-.526	.375	-.225	.126	1.000	.229	.223
9	.497	.212	.097	-.041	.256	.293	-.118	.229	1.00	.653
10	.586	.254	.197	-.108	.360	.194	-.151	.223	.653	1.000

1. Share of investments in fixed capital that is in private ownership
2. Share of investments infixed capital for expansion of functioning enterprises
3. New housing construction
4. Total unemployment rate
5. Consumption of meat products
6. Share of foods in money expenditures of the population
7. Enterprises unpayment of wages
8. Profitability of the realised industrial products
9. Share of fixed capital in private ownership
10. Percentage of population employed in private sector of economy

Table A2.4. Orthogonal rotation matrix

	1	2	3	4
1	0.706	0.480	-0.212	-0.476
2	-0.243	0.840	0.360	0.327
3	0.621	-0.244	0.632	0.394
4	0.239	0.070	-0.653	0.715